Sulphur Springs Valley Electric Cooperative, Inc.
Small Residential, Single-Phase 120 V or 120/240 V, 15 kW or Less
Photovoltaic System Interconnection Requirements for SunWatts Program
September 1, 2004

1.0 GENERAL REQUIREMENTS

1.1 The following photovoltaic (PV) system interconnection requirements by Sulphur Springs Valley Electric Cooperative, Inc. (SSVEC) are the minimum requirements by SSVEC to ensure proper interface of small residential, single-phase 120 V or 120/240 V, 15 kW or less, photovoltaic systems with the utility. These minimum requirements are based on the **IEEE Recommended Practice for Utility Interface of Residential and Intermediate Photovoltaic Systems (ANSI/IEEE Std 929)**. In addition to the following minimum requirements, the customer is responsible for complying with all other applicable technical standards, safety codes, **Article 690 of the National Electric Code**, and equipment manufacturers' specifications related to the design, installation, operation, and maintenance of the customer's entire electrical installation, including the PV system, not specifically mentioned in this document. **The PV System Components must be Listed and Tested by a Nationally Recognized Testing Laboratory (NRTL) to UL Standard 1741.**

2.0 AGREEMENT PROCESS REQUIREMENTS

2.1 The customer contacts SSVEC and requests interconnection requirements. SSVEC will forward interconnection requirements (page 1 through 3) and agreement form (page 4, 5 and 6).

2.2 The customer reviews the interconnection requirements and returns the signed and completed agreement form (page 4, 5 and 6) to SSVEC, which verifies that the customer is in agreement with the interconnection requirements. SSVEC will not sign the agreement form authorizing parallel operation with the utility until section 2.6 is complete.

2.3 SSVEC will approve the agreement form, if the customer has submitted the correct information, and the customer has signed the agreement form. SSVEC will then verbally contact the customer, and give the customer permission to proceed with the PV project. The customer should not proceed with the PV project until SSVEC approves the agreement form, and verbally contacts the customer.

2.4 The customer must obtain all permits and inspections required by city or county inspectors regarding the installation of the PV system. The PV system must be installed by a licensed electrical or PV contractor. The disconnect switch must be inspected by a licensed electrician.

2.5 After the PV system has been installed, inspected, and approved by the city or county inspector, the customer should contact SSVEC. SSVEC will inspect the PV system installation to confirm that it complies with the interconnection requirements. SSVEC recommends the licensed electrical or PV contractor be on site when SSVEC inspects the PV system installation to answer any questions that SSVEC may have.

2.6 After SSVEC has inspected the PV system installation, and confirmed that it meets the interconnection requirements, SSVEC will then sign the agreement form, which authorizes the customer to operate the PV system in parallel with the utility. SSVEC will send copies of the completed agreement form to the customer.

3.0 POWER QUALITY REQUIREMENTS

3.1 The power quality at the customer's meter must be within **published national voltage (ANSI/IEEE Std C84.1) and harmonic (ANSI/IEEE Std 519) standards**. The PV system must not exceed SSVEC flicker standards, and must operate in synchronism with the utility at 60 Hz. The PV system must not inject direct current (DC) into the alternating current (AC) system. In addition to these standards, the customer's PV system must not cause noticeable interference with telephone, radio, computer or other communication systems. If the customer's power quality does not meet these standards or if the PV system interferes with the power quality of other SSVEC customers, SSVEC reserves the right to disconnect the PV system from the utility.

4.0 PROTECTION REQUIREMENTS

4.1 The customer must ensure that the PV system automatically disconnects from the utility if SSVEC, or other personnel, open an upstream breaker, fuse, or switch to de-energize the utility power source to safely work on local area power lines or equipment. Without proper protection, the PV system could potentially backfeed the local area loads, and energize the local area power lines. This condition is called "islanding" and is extremely dangerous because SSVEC, or other personnel, will have assumed that they have isolated the utility power source, and could potentially be electrocuted by the customer's PV system backfeeding the utility. This situation is absolutely intolerable and it is the customer's responsibility to ensure that the PV system will automatically disconnect from the utility under these conditions.

4.2 Upstream SSVEC distribution breakers will trip open due to temporary faults (lightning strikes, etc.) and will automatically reclose 1-2 seconds later. Upstream SSVEC transmission breakers will also trip open due to temporary faults and will automatically reclose instantaneously. It is the customer's responsibility to ensure that the PV system has automatically disconnected from the utility before an upstream utility distribution or transmission breaker automatically recloses onto the PV system out of synchronism. SSVEC will not be responsible for any damage caused by an upstream utility breaker automatically reclosing onto the customer's PV system out of synchronism.

4.3 The following minimum protection is required by SSVEC to prevent the PV system from islanding the utility. The PV system must automatically disconnect from the utility 2 seconds (120 cycles) after the voltage deviates outside the voltage range 88-110% of nominal. The PV system must automatically disconnect from the utility 0.1 second (6 cycles) after the frequency deviates outside the frequency range of 59.3-60.5 Hz. After the PV system has disconnected from the utility, it should remain disconnected until voltage and frequency is within the above voltage and frequency ranges for 60 seconds.

4.4 In addition to the minimum protection required by SSVEC, it is the customer's responsibility to ensure that all additional personnel safety and equipment protection devices required by all other applicable technical standards, safety codes, and equipment manufacturers' specifications are properly installed. SSVEC is not responsible for the protection of the customer's PV system.

5.0 DISCONNECT SWITCH REQUIREMENTS

5.1 The customer shall install a SSVEC accessible, outdoor mounted, load break disconnect switch with a visible open that is capable of being padlocked in the open position by SSVEC personnel. The disconnect switch shall be mounted at the service entrance next to the meter, properly grounded, and clearly labeled "**PHOTOVOLTAIC SYSTEM AC DISCONNECT**". The disconnect switch shall be installed on the alternating current (AC) circuit between the utility and AC input to the PV inverter. The purpose of the disconnect switch is for SSVEC, or other personnel, to disconnect the PV system from the utility to eliminate all potential sources of backfeed when it is necessary to safely work on local area power lines or equipment. The customer understands that SSVEC has the right to padlock the disconnect switch in the open position at any time, without notice to the customer. The customer also understands not to tamper with, or remove the padlock if the disconnect switch is padlocked in the open position by SSVEC. The disconnect switch must be installed by a licensed electrician.

6.0 ANNUAL INSPECTION

6.1 SSVEC will conduct at least one inspection annually, at no cost to the costumer. The customer shall provide SSVEC personnel with reasonable access to the PV system to conduct the annual inspection. This inspection will consist, at a minimum, of a visual inspection of required equipment and a test to verify that the equipment will still disconnect properly from the utility when the utility power is disconnected.

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Please print the following information.

Customer Information

Customer Name_____

Customer Street Address_____

Customer Mailing Address_____

Customer Telephone Number_____

Photovoltaic Inverter Information

Manufacturer_____

Model Number_____

Number of Units_____

AC Output Voltage (120 V or 120/240 V AC)_____

Total Power Output (kVA or kW)_____

Protection Information

Please list the available range of protection settings, which should include pickup values and time delays.

Under/Over Voltage Protection_____

Under/Over Frequency Protection_____

Under/Over Current Protection _____

Other Protection_____

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Installation Information

The system has been installed in compliance with IEEE 929 "Recommended Practice for Utility Interface of Photovoltaic (PV) Systems" and the latest edition of the National Electric Code. The Photovoltaic System components are Listed and Tested by a NRTL to UL Standard 1741.

Installer (signed)_____

Installer License No._____

Name (print)_____

Mail Address_____

Telephone Number_____

Disconnect Switch

Electrician's Name (print) _____

Electrician (signed) _____

Electrician License No. _____

Additional Information

The customer must include an electrical one-line and three-line diagram of the PV installation with this agreement form. The electrical one-line diagram must show connections, circuit breakers, fuses, etc. between main electrical components such as meter(s), main panel, disconnect switch, PV inverter(s), sub-panel, loads, etc. The customer must also include a detailed map that shows major cross roads and plant locations. A Site Plan must be submitted showing the arrangement of major equipment, including the electric service entrance section and utility meter, locations of PV inverter, interface equipment, and Disconnect Switch. The licensed electrical or PV contractor should be able to provide the electrical one-line diagram, three-line diagram, detailed map, and site plan.

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By signing below, the customer understands, and is in agreement with, Sulphur Springs Valley Electric Cooperative, Inc. Photovoltaic System Interconnection Requirements. The customer should not proceed with the PV project until SSVEC verbally contacts the customer and indicates approval of the information supplied by the customer on the agreement form. The customer should not operate the PV system in parallel with the utility until SSVEC has approved the photovoltaic installation and has signed below.

_____ _____

Customer's Signature Date

By signing below, Sulphur Springs Valley Electric Cooperative, Inc. has inspected and confirmed that the customer's photovoltaic system installation has met Sulphur Springs Valley Electric Cooperative, Inc. Photovoltaic System Interconnection Requirements, and therefore, the customer is authorized to operate the PV system in parallel with the utility.

_____ _____

SSVEC's Signature Date

SSVEC WILL NOT ASSUME ANY RESPONSIBILITY FOR THE PROTECTION OF THE CUSTOMER'S PHOTOVOLTAIC SYSTEM, OR OF ANY OTHER PORTION OF THE CUSTOMER'S ELECTRICAL EQUIPMENT. THE CUSTOMER IS FULLY AND SOLELY RESPONSIBLE FOR PROTECTING THEIR EQUIPMENT IN A MANNER TO PREVENT ANY FAULTS OR OTHER DISTURBANCES FROM DAMAGING THE CUSTOMER'S EQUIPMENT.